

(12) UK Patent Application (19) GB (11) 2 108 133 A

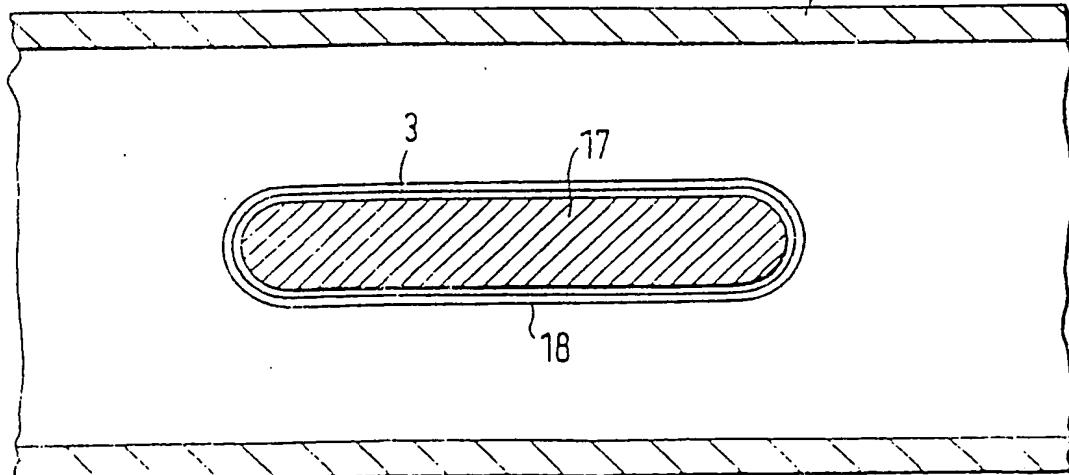
(21) Application No 8215541
 (22) Date of filing 3 Jan 1980
 Date lodged 27 May 1982
 (30) Priority data
 (31) 2900200
 (32) 4 Jan 1979
 (33) Fed. Rep. of Germany (DE)
 (43) Application published
 11 May 1983
 (51) INT CL³
 C08F 2/52
 (52) Domestic classification
 C3P KN
 C3T 422 PH
 C3W 100 222 303
 U1S 1422 2150 3010
 3025 C3P C3T
 (56) Documents cited
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GB 0786010
 EP 0025772
 GB A 2045263
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 GB 1559502
 (58) Field of search
 C3P
 C3T
 (60) Derived from Application
 No. 8000176 under section
 15(4) of the Patents Act
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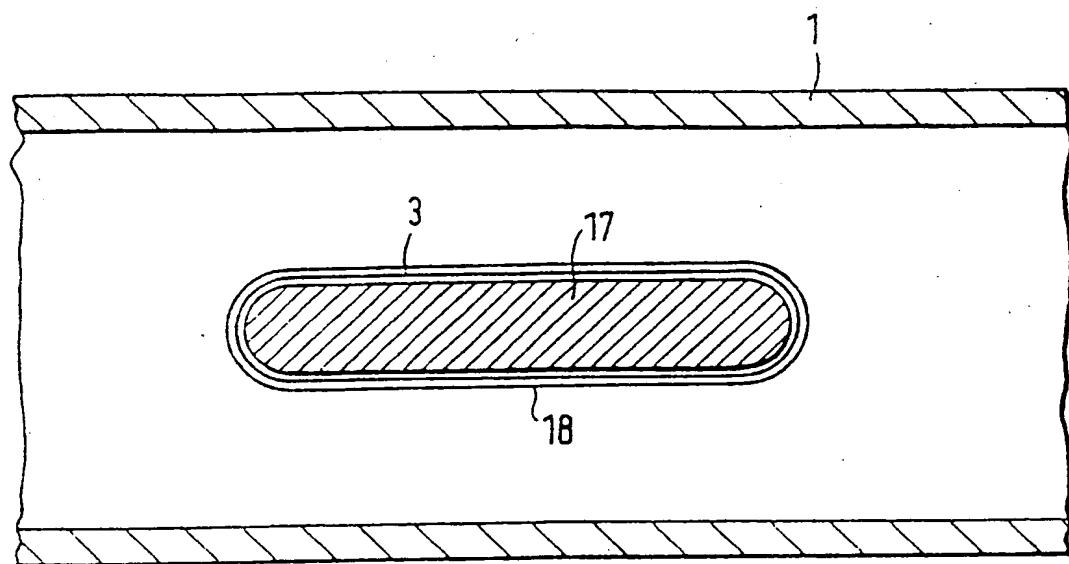
(54) **Electrical gas discharge
 polymerization method of coating a
 resistor**

(57) A method of providing a
 corrosion-resistant hydrophobic
 protective layer (18) of dielectric
 material on a temperature-dependent
 resistor (3) comprises subjecting the
 resistor to a monomeric organic
 substance (e.g. hexamethyl disiloxane
 or hexafluoropropylene) which is
 polymerized on the surface of the
 resistor from the vapour phase with
 the assistance of energy from an
 electrical gas discharge. The
 polymerization is interrupted at least
 once so as to promote nucleus
 formation (seed formations) and
 provide a pinhole-free layer.



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SPECIFICATION

Method of coating a resistor

The present invention relates to a method of providing a protective layer on temperature-dependent resistor.

5 A measuring probe is known in which a temperature-dependent resistor formed as a layer is in direct contact with a flowing medium. The resistance layer is subject to corrosive attack from 10 the medium and measurement errors are caused by any electrical conductivity of the medium and/or change in the heat transfer resistance.

15 According to the present invention there is provided a method of providing a corrosion resistant hydrophobic protective layer of dielectric material on a temperature-dependent resistor, comprising the steps of subjecting the temperature-dependent resistor to a monomeric organic substance which is polymerized on the 20 surface of the resistor from the vapour phase with the assistance of energy from an electrical gas discharge, and interrupting the polymerisation at least once.

25 The polymerization may be effected by a non self-maintaining as discharge which is sustained by thermionic emission electrons, or by a self-sustaining glow discharge.

30 A thin, such as about 0.1 to 2 μm thick, closed layer possessing extremely small heat transfer resistance can be produced, which inhibits 35 deposits by hydrophobia and thereby provides long-term stability of the resistor.

35 By interrupting, at least once, the polymerization process, nucleus formation (seed formation) during the condensation is repeatedly promoted, so that a pinhole-free layer is formed.

40 An example of the present invention will now be more particularly described with reference to the accompanying drawing, the single figure of which is a schematic view of a temperature-dependent resistor coated by a method exemplifying the invention and arranged as a measuring probe in an engine induction duct.

45 Referring now to the drawing, there is shown an induction duct 1 of an internal combustion engine, through which air inducted by the engine can flow. Arranged in the duct 1 is a temperature-dependent resistor 3 serving as a measuring probe for the flow rate of the inducted air. The 50 resistor 3 may be formed as a resistance layer or coating applied by a known process to one or both sides of support 17. If the support 17 is made from an electrically conductive material, then an insulating layer (not shown) is provided 55 between the resistance layer and the support 17. A dielectric, corrosion-resistant, pinhole-free, hydrophobic protective layer 18 is applied to the resistance layer. The protective layer 18 should, if possible, be no thicker than 4 μm , preferably 0.5 60 μm , so that the heat transfer between the flowing air and the resistance layer is impeded as little as possible and the measuring probe can respond rapidly to temperature changes. The protective layer is an organic substance, preferably a silicon-

65 organic substance, which is precipitated from the vapour phase by radiation polymerization. Hexamethyl disiloxane or hexafluoro-propylene may be used as the starting monomer for such polymerization. Starting materials of such a type 70 for the production of a protective layer by polymerization are disclosed in, for example, DE-OS 2 263 480, DE-AS 2 537 416 and DE-OS 2 625 448. Also disclosed in these specifications are methods of precipitating a layer by 75 polymerization from the vapour phase by means of energy from an electric gas discharge. Thus the polymerization can be effected by a non self-maintaining gas discharge sustained by thermionic emission electrons, or by a self-sustaining glow discharge. The polymerization operation is interrupted at least once, causing nucleus formation to be promoted afresh during condensation and a pinhole-free layer to be formed by multiple condensation.

80 85 A resistance layer provided with a protective layer by a method exemplifying the invention may, when used for air flow rate measurement, be protected from corrosive attack by the flowing air and may avoid measurement errors arising from 90 any electrical conductivity of the air or from a change in the heat transfer resistance due to deposits.

Claims

1. A method of providing a corrosion-resistant hydrophobic protective layer of dielectric material on a temperature-dependent resistor, comprising the steps of subjecting the temperature-dependent resistor to a monomeric organic substance which is polymerized on the surface of the resistor from the vapour phase with the assistance of energy from an electrical gas discharge, and interrupting the polymerisation at least once.
2. A method as claimed in claim 1, wherein the polymerization is effected by a non self-maintaining gas discharge which is sustained by thermionic emission electrons.
3. A method as claimed in claim 1, wherein the polymerization is effected by a self-sustaining glow discharge.
4. A method as claimed in any one of the preceding claims, wherein the substance is a silicon-organic substance.
5. A method of providing a corrosion-resistant hydrophobic protective layer of dielectric material on a temperature-dependent resistor, substantially as hereinbefore described with reference to the accompanying drawing.
6. A temperature-dependent resistor provided with a corrosion-resistant hydrophobic protective layer of dielectric material by a method as claimed in any one of the preceding claims.

New claims or amendments to claims filed on 16 December 1982

125 Superseded claims 1

New or amended claims:—

1. A method of providing a corrosion-resistant

hydrophobic protective layer of dielectric material
on a temperature-dependent resistor, comprising
the steps of subjecting the temperature-
dependent resistor to a monomeric organic
5 substance, which is polymerized on the surface of
the resistor from the vapour phase with the

10 assistance of energy from an electrical gas
discharge and which is such as to provide a
corrosion resistant hydrophobic dielectric
polymer, and interrupting the polymerization at
least once.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office,
25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained